Insect Molecular Genetics, Systematics and Phylogeny

J. J. Stuart and V. R. Ferris

ENTM 60300 (3 credits)

Prerequisite: AGRY 320 or equivalent in Genetics

The goal of this course is to introduce new concepts and methods in molecular genetics, systematics and phylogeny to students of varied interests and backgrounds. The new lines of inquiry are introduced via both classic and current journal publications, and the students themselves lead many of the discussions about these papers. Background information and methodology is presented concurrently to make the concepts accessible to every student. The course is designed to facilitate student interest, participation, and learning. Journal articles used are updated and/or changed frequently, as new publications appear.

Part 1: Arthropod Genetics (8 weeks – J. J. Stuart)


week 2 – Genes on chromosomes. Concepts: Insect chromosome structure, cell cycles (including anomalous cycles, linkage analysis, linkage disequilibrium.


week 4 – Biochemical genetics. Concepts: Epistasis, biochemical pathways, complementation analysis, reverse genetics, RNAi.


week 7 – Transgenics. Concepts: Insect transformation for both experimentation and population control.

week 8 – Review and mid-term exam

Part 2 – Molecular Systematics and Phylogeny (8 weeks – V. R. Ferris)

week 9 – Concepts: Why study Molecular Systematics? New kinds of molecular data
week 10 – Concepts: Visualizing trees – the tree-thinking challenge.

week 11 – Concepts: Visualizing trees (cont.); techniques for inferring molecular phylogenies (algorithms for doing this; bootstrapping).

week 12 – Concepts: Examples of the use of phylogenetic reconstruction and tree-thinking in recent research.

week 13 – Concepts: Using biological data bases and inferring phylogenies (programs for students to download and use).

Week 14 – Continue above (TG break).

week 15 – Concepts: Tree of Life, the future of systematics, new controversies in Evo-Devo, barcoding pros and cons.

week 16 – Continue with Future of Systematics; and Review.